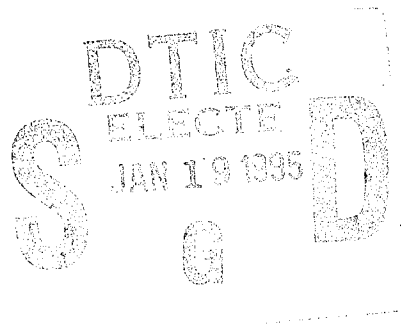


NAVAL POSTGRADUATE SCHOOL

Monterey, California



THESIS



THE ADDED VALUE OF QUALITATIVE
VARIABLES IN A QUANTITATIVE MANPOWER
MODEL FOR DOD MTF IS DEPARTMENTS

by

Kim C. Carver

September 1994

Thesis Co-Advisors:

James A. Scaramozzino
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19950117 032

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE September 1994		3. REPORT TYPE AND DATES COVERED Master's Thesis
4. TITLE AND SUBTITLE THE ADDED VALUE OF QUALITATIVE VARIABLES IN A QUANTITATIVE MANPOWER MODEL FOR DOD MTF IS DEPARTMENTS(U)			5. FUNDING NUMBERS	
6. AUTHOR(S) Carver, Kim C.				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey CA 93943-5000			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)			10. SPONSORING/MONITORIN AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.				
12a. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.			12b. DISTRIBUTION CODE A	
13. ABSTRACT (maximum 200 words) Because of concern over the budget deficit and the end of the Cold War, the Department of Defense (DoD) has become the target of massive downsizing. As a result, the justification of manpower levels through the use of manpower models has become increasingly important. This thesis addresses those qualitative/unquantifiable factors in the DoD Medical Treatment Facility (MTF) Information Systems (IS) environment that should be considered in the development of a manpower model or staffing standard for a DoD MTF IS department. These factors include DoD's movement to the managed/coordinated care environment, a macro verses a micro approach to model development, model flexibility, cost-effectiveness, and consistency, as well as the usefulness of the model for planning purposes. The various models or methodologies employed by the Army, Navy, and Air Force to staff their respective MTF IS departments are evaluated in light of these factors. Because they are difficult to quantify, qualitative factors are frequently overlooked. They do, however, contribute to model effectiveness, efficiency and longevity in that they consider some of the broader climatic concerns a mathematical formula often omits, and should be incorporated into the model building process.				
14. SUBJECT TERMS Manpower Model, Information Systems, Medical Treatment Facility			15. NUMBER OF PAGES 62	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UL	

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QUANTITATIVE MANPOWER MODEL FOR DOD MTF IS

DEPARTMENTS

by

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Submitted in partial fulfillment
of the requirements for the degree of

MASTER OF SCIENCE IN INFORMATION TECHNOLOGY
MANAGEMENT

from the

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Accession For	
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DTIC	TAB <input type="checkbox"/>
Unannounced <input type="checkbox"/>	
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Because of concern over the budget deficit and the end of the Cold War, the Department of Defense (DoD) has become the target of massive downsizing. As a result, the justification of manpower levels through the use of manpower models has become increasingly important. This thesis addresses those qualitative/unquantifiable factors in the DoD Medical Treatment Facility (MTF) Information Systems (IS) environment that should be considered in the development of a manpower model or staffing standard for a DoD MTF IS department. These factors include DoD's movement to the managed/coordinated care environment, a macro verses a micro approach to model development, model flexibility, cost-effectiveness, and consistency, as well as the usefulness of the model for planning purposes. The various models or methodologies employed by the Army, Navy, and Air Force to staff their respective MTF IS departments are evaluated in light of these factors. Because they are difficult to quantify, qualitative factors are frequently overlooked. They do, however, contribute to model effectiveness, efficiency and longevity in that they consider some of the broader climatic concerns a mathematical formula often omits, and should be incorporated into the model building process.

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I. INTRODUCTION

A. BACKGROUND

A staffing standard is defined by Department of Defense (DoD) Instruction 5010.37 as:

A DoD Component-approved, quantitative and qualitative expression of personnel requirements. It identifies the human resources needed to do prescribed tasks and activities at varying levels of workload volume. [Ref. 1]

Staffing standards provide a uniform methodology for determining the manpower requirements necessary for an effective and efficient organization. A number of developments over the past decade point to the need for staffing standards or manpower models.

One development has been the increasing scrutiny by Congress of all activities within the DoD. Because of the concern over the budget deficit as evidenced by the passage of the Gramm-Rudman-Hollings Acts I and II and the Budget Enforcement Act of 1990, as well as the so called "peace dividend" resulting from the end of the Cold War, the DoD has been the target of massive downsizing. Staffing standards can be used to increase the efficiency and accuracy of manpower requirements for planning purposes. They help justify budget requirements/expenditures in an environment of increasingly scarce and fiercely contested resources.

Staffing standards are further supported as outputs of the Efficiency Review (ER) process as described in DoD Instruction

5010.37. The end product of an ER is a Most Efficient Organization (MEO) "structured to achieve economy, efficiency of operation, effective employee utilization, optimum mix of staffing, and proper classification of civilian positions." [Ref. 1] A MEO can result in significant cost savings, both in terms of personnel and operational requirements, and supports the federal government's latest management reform effort, the National Performance Review.

DoD Medical Treatment Facilities (MTFs) have not been spared the effects of budget slashing and the increasing emphasis on output performance. They are being asked to "do more with less," to provide cost-effective quality health care. In 1987, at the recommendation of the Blue Ribbon Panel, the Joint Healthcare Management Engineering Team (JHMET) was established to create manpower standards for all work centers within Service MTFs [Ref. 2]. The team has met with limited success, with approximately fifty standards generally accepted but not necessarily utilized by all three Services.

Most of these standards have addressed the clinical areas of inpatient, outpatient, and ancillary services. According to Jeanne Luther of the JHMET in San Antonio, Texas, the Services have not been able to agree upon manpower standards for support services such as financial management, administration, material services, and information systems

because of perceived differences in organizational structure and function [Ref. 3]. In such instances, each Service has developed its own methodology for manpower determination. The manpower determination of one of these support services, information systems, is the subject of this thesis.

B. OBJECTIVES

In an increasingly complex and competitive world, information systems (IS) have become the cornerstone of many organizations. From being simple data processing machines that performed repetitive tasks, computers and their associated peripheral devices and communications technology have become an integral part to the business environment. MTF commanding officers that once tolerated the IS department as a necessary evil to generate the reams of paperwork required by upper echelons, now view IS as a major player in the strategic planning process. IS can be used to reduce costs, increase patient satisfaction, report on quality, increase interorganizational data sharing, improve operational processes [Ref. 4], and provide feedback to providers on patient care.

S. D. Christian and W. K. Dorr state in their thesis:

An information system is an entity composed of hardware, software, data, procedures and people. The information system's functions are to collect, transmit, process, and store data, and retrieve and distribute information to the system users [Ref. 5].

A key component in the above definition is "people." High-tech state-of-the-art hardware/software is useless without a highly trained, proficient, and properly balanced staff. Herein lies one of the difficulties in managing IS. What is the optimum number, mix and expertise levels needed to operate an IS department both effectively and efficiently? Staffing standards can be developed to help answer this question.

This thesis attempts to address those qualitative vice quantitative factors in the MTF IS environment that should be considered in the development of a manpower model or staffing standard for IS. The various models or methodologies employed by the Services to staff their respective IS departments are evaluated in light of these factors. Although no model is developed, recommendations as to a future DoD staffing standard for a MTF IS department are made.

C. RESEARCH QUESTIONS

Primary question: Do any of the current Service models reflect the qualitative factors in the MTF IS environment that should be considered in the development of a manpower model or staffing standard for a DoD MTF IS department?

In order to properly address the primary question, the following secondary questions need to be answered:

Question 1: What is the general procedure for developing a staffing standard?

Question 2: What are the quantitative factors in a staffing standard?

Question 3: What are the qualitative factors in a staffing standard?

Question 4: What staffing standards or procedures do the Services currently employ to determine manpower requirements for MTF IS departments?

Question 5: Do, or even can, these staffing standards or models reflect these identified qualitative factors?

D. SCOPE, LIMITATIONS AND ASSUMPTIONS

This thesis assumes that those quantitative factors of a manpower standard that are more concerned with the "statistical correctness" of the model have been properly evaluated by the model creators. The focus of this research is those "qualitative" factors that may or may not have been incorporated into the developmental process. Although JHMET and the respective Services have created manpower standards for many of the departments commonly found within a DoD MTF, only those standards pertaining to the IS department are evaluated. As previously stated, no manpower standard or model is developed, but recommendations as to a future DoD staffing standard for a MTF IS department are made.

E. METHODOLOGY

A number of studies of manpower models or staffing standards have been completed that attempted to build these

models through the use of regression or correlation analysis. In his thesis, Kenneth L. Rado evaluated the manpower demand forecasting system used by the Naval Facilities Engineering Command. He spoke of "unquantifiable factors" that influenced the manpower staffing process such as demographics/area costs, political considerations, economies of scale, experience level/turnover, and quality of work. [Ref. 6] This thesis examines similar unquantifiable or "qualitative" factors in the MTF IS environment such as DoD's movement to the managed/coordinated care environment, a macro verses a micro approach to model development, model flexibility, cost-effectiveness, and consistency, as well as the usefulness of the model for planning purposes. These factors were obtained during a literature review and conversations with individuals such as BoB Hawkins of the Air Force Management Engineering Agency and Jeanne Luther of JHMET.

F. THESIS ORGANIZATION

Chapter I discusses the importance of staffing standards and presents the thesis research questions, scope, limitations, assumptions, and methodology of the study. Chapter II describes in more detail current budget trends, the ER process, the Joint Healthcare Management Standards, the Services' response to those standards, and the reasoning behind this study. Chapter III examines Service staffing standards or procedures for determining MTF IS manpower

requirements. Chapter IV analyzes Service staffing standards in light of qualitative factors in the MTF IS environment. Chapter V provides recommendations and conclusions.

II. BACKGROUND

A. DOMESTIC/DEFENSE SPENDING TRENDS

The period extending from President Reagan's to President Clinton's administration has seen a complete reversal in spending priorities within the Department of Defense (DoD). During the Reagan era defense spending was easier to justify, sometimes at the expense of domestic programs, in light of the existence of the Soviet Union. [Ref. 7] The defense complex mushroomed as military strategists sought to halt the spread of communism.

During the Reagan years, however, concern over the budget deficit and the escalating national debt began to surface. The Gramm-Rudman-Hollings Act, passed by Congress in 1985 and amended in 1987, called for a balanced Federal budget by 1993. It set declining deficit targets for each fiscal year and specified a process for achieving those targets. The Budget Enforcement Act of 1990 changed the emphasis in the congressional budget process from controlling the growth of the deficit to limiting government spending. It divided the discretionary appropriations portion of the budget into three packages (defense, domestic, and international), and established caps or spending targets for each package. [Ref. 8] The total for discretionary spending was capped in 1993 at 547 billion through 1998.

These steps to control the deficit, along with the end of the Cold War and the growing concern over domestic issues, have created new national priorities. Even the "bottom-up review" conducted by the Pentagon has failed to convince many analysts that approximately \$1.2 trillion is needed for defense over the next five years. The public is demanding the diversion of more and more funds from defense to domestic programs. [Ref. 7] The passage of a crime bill and a national healthcare plan will place further constraints on an already shrinking budget. It is almost a given that DoD will continue to experience budget reductions to help support domestic programs.

B. EFFICIENCY REVIEW PROCESS

In this era of the "shrinking budget," the Efficiency Review (ER) process is the primary tool used to justify manpower requirements in auxiliary and support activities. [Ref. 1,9,10] An ER is a structured and disciplined approach used to establish a Most Efficient Organization (MEO). It is the basis for a continued and directed effort to increase productivity, performance, efficiency and effectiveness.

The ER process seeks to:

1. identify authorized products or services of the activity in performance work statements (PWS)
2. establish standards for quality, quantity and timeliness of the output

3. determine whether an activity can be consolidated, transferred or eliminated
4. streamline or eliminate existing rules, regulations, and procedures that inhibit productivity improvement. [Ref. 1]

The output of the ER is a MEO. It defines the minimum quantity and quality of manpower required to produce the outputs established in the activity's PWS.

The MEO is supported by staffing standards, either developed during the ER process, or developed by other Service or DoD components and validated during the ER process. [Ref. 1,9,10] Outputs of these staffing standards include:

1. definitions of work to be accomplished using improved methods and processes
2. statement of workload elements which vary manpower requirements
3. mathematical equation that shows the relationships between workload elements and the total measured workload
4. staffing table that shows the quantity and quality (specific skills) required to accomplish varying levels of workload.

Approved staffing standards are used to forecast manpower requirements, justify manpower resources in the Programming, Planning and Budgeting System, and answer "what if" questions for planning purposes. [Ref. 9,10]

As an auxiliary or supporting activity, a medical treatment facility (MTF) must compete with other supporting activities as well as strategic and tactical units for limited

funding. The purpose of the MTF is to provide medical and/or dental care to DoD eligible individuals. Approximately 8.7 million people were eligible for DoD healthcare benefits in FY-93. \$ 7.4 billion alone was spent to provide healthcare to non-active duty beneficiaries. [Ref. 11]

The focus of this thesis will be the fixed MTF defined as "an established land-based medical center, hospital, clinic, or other facility that provides medical, surgical or dental care," as opposed to the nonfixed MTF such as an aid station, clearing station, field hospital, hospital ship, or a sick bay aboard a ship [Ref. 12].

C. JOINT HEALTHCARE MANPOWER STANDARDS

In July 1985 upon the recommendations of the Blue Ribbon Panel, a working group was established by the Secretary of Defense to consider a joint staffing methodology for DoD MTFs. The end product of the working group was the creation of the Joint Healthcare Management Engineering Team (JHMET) to develop Joint Healthcare Manpower Standards (JHMS) for the military Services.

As stated in DoD 6025.12-STD the purpose of the DoD JHMS is to:

insure that the peacetime staffing requirements of the Military Health Services System (MHSS) provide quality medical care in a productive environment. The JHMS provides the DoD and the MHSS with a uniform system for determining peacetime healthcare manpower requirements for operation of fixed military MTFs.

These standards do not apply to nonfixed MTFs, nor to DoD facilities such as medical research facilities and schools.

The objectives of the JHMS are to:

1. provide military healthcare management with a uniform process for determining requirements and applying MTF staffing standards
2. provide guidance for determining demand on work centers and for ensuring appropriate performance levels, staffing sequences, and other workload factors are employed in satisfying workload
3. provide a means of identifying unique facility and system healthcare manpower requirements
4. provide actual and potential areas of interservice support of healthcare workload
5. provide a method for forecasting healthcare manpower requirements based on mission and/or service population changes.

The JHMS compliments the ER process by providing the staffing standards or manpower guides needed to justify the MEO.

Staffing standards are to be developed for each workcenter within a MTF. [Ref. 2] A workcenter is "a discrete function or subdivision of an organization for which provision is made to accumulate and measure its expense and determine its workload performance [Ref. 12]." Each staffing standard is developed using work measurement methods such as work sampling, time studies, operational audits, and the study of staffing patterns, functional models and historical data. If a manpower model cannot meet the stringent statistical

requirements of a staffing standard, it is classified as a manpower guide.

The original intent of JHMS was the creation of staffing standards that were to be mandatory for all Services, however, many of the staffing standards approved up to this point have been classified only as manpower guides. [Ref. 2] As such, the Services are not required to use them and have developed or are in the process of developing unique standards of their own. Additionally, JHMET has not developed staffing standards for many non-clinical workcenters such as information systems (IS) because of Service disagreements over organizational structure and function. Each Service is pursuing its own agenda. [Ref. 3]

D. QUALITATIVE FOCUS

Interest in MTF IS manpower standards was sparked by CDR Bruce L. Custis, Executive Officer of the Naval Medical Information Management Center in Bethesda, MD. He was at the time involved in a model building process for Navy MTF IS departments and welcomed any input. [Ref. 13] Originally, the plan was to compare/contrast Service IS manpower models to determine the "best" one, but the difficulty of such an undertaking was soon realized. Research revealed that although the Services were at different stages in the model building process, all had gone through or were going through a similar methodology. Each Service analyzed workload methods

and processes to determine if a statistical relationship could be established between workload output and manpower requirements. Regression analysis was used to find variable relationships and equations were verified through the use of statistical measures such as standard error and confidence intervals [Ref. 14]. Who was to say that the manpower standards developed, or in the process of being developed, were not "statistically sound" for a particular Service? Instead a decision was made to concentrate on those qualitative factors that should be incorporated into the model building process for a MTF IS department. Because they are difficult to quantify, qualitative factors are often overlooked. They do, however, contribute to model effectiveness, efficiency and longevity in that they consider some of the broader, climatic concerns a mathematical formula often omits.

III. SERVICE STAFFING STANDARDS

A. INTRODUCTION

This chapter will describe the staffing standards or processes used by Army, Air Force, and the Navy to determine Information System (IS) manpower requirements. The Army model will include a general description of the inpatient, outpatient, and ancillary workcenter staffing standards because they relate directly to the equation used for IS. The Air Force staffing standard is still under study and has not been officially approved or released. It is subject to change and its final form may vary from its description in this thesis. As of this writing, the Navy has no IS staffing standard, but is in the middle of an Efficiency Review (ER) process to determine manpower staffing requirements.

B. THE ARMY'S MANPOWER STAFFING ASSESSMENT MODEL

The Army Health Services Command (HSC) feels that the staffing standards developed by the Joint Healthcare Management Engineering Team (JHMET) inflate manpower figures, especially at facilities that provide graduate medical education, and in October of 1992 began to develop the Manpower Staffing Assessment Model (MSAM). A Staffing Assessment Team (SAT) will develop a MSAM for each Army Medical Treatment Facility (MTF) by October of 1995. The model development process is very time consuming and

expensive, but the HSC believes that the final models will require only periodic fine tuning.

The HSC does not view the MSAM as just a staffing standard, but considers it a powerful management tool. In one single database, it provides the MTF Commanding Officer (CO) and officials at HSC access to detailed workload and manhour data for individual workcenters. Data is updated monthly and is reviewed and analyzed to identify workcenter variances. A workcenter may stand out because its workload is much lower than either the benchmark or command average. If such is the case, then the reasons behind the lower workload must be determined. The MSAM can assist in this process by allowing the CO to look at variables beyond simple manpower and workload data. Health care provider availability as well as physical and manpower support capabilities can be studied. "What if" scenarios can be performed where workload data is manipulated and other miscellaneous factors such as workcenter benchmarks, provider availability hours, or site unique factors can be modified. The potentials of resource shifting or of recapturing Civilian Health and Medical Program of the Uniformed Services (CHAMPUS) workload can be investigated. The MSAM is meant to be used as a tool to resolve inappropriate variances, not to single out workcenter staffers for censure or punishment. The goal of MSAM is an effective

and efficient organization, an organization that provides quality health care at a reasonable cost.

The entire model, of which the IS portion is only a small part, is based upon workload and manhours data input from the Medical Expense and Performance Reporting System (MEPRS). MEPRS is a DoD medical system that collects workload, manhours, and expense data at the workcenter level. Workcenters are divided into functional categories: inpatient care, outpatient care, dental services, ancillary services, support services, and special programs. The IS workcenter supports the operation of the Mainstream Business Functions (MSBFs), those inpatient, outpatient, and ancillary services that are dedicated to providing direct health care to the patient. The operation of the model on the MSBFs must be briefly explained in order to understand how IS manpower resources are determined. The MSAM compares reported Full Time Requirements (FTRs) to model generated earned FTRs for all MSBFs. Reported FTRs come directly from MEPRS and provide the number of personnel that have worked in a particular workcenter for a set period of time, usually a month or a quarter. Inpatient reported FTRs do not include provider personnel such as physicians, residents, dentists, and direct care professionals such as nurse practitioners, while outpatient and ancillary reported FTRs do. All MSBFs reported FTRs include personnel such as nurses, direct care

paraprofessionals, and administrative staff. Reported and earned FTRs are computed by dividing total manhours by 145, the Army's peacetime monthly manhour availability factor.

To compute earned FTRs for workcenters within each MSBF, there is a common formula, but these formulas may vary somewhat depending on the particular workcenter. For example, outpatient services are divided into provider and non-provider driven workcenters, each with its own computational method. All formulas, however, have several variables in common. All use some sort of workload factor such as monthly occupied bed days for inpatient services, monthly visits for outpatient services, and weighted procedures and workload counts for ancillary services. All use benchmarks to bring effectiveness and efficiency into the equation. For instance, the benchmark time for inpatient services reflects the amount of time nurses and direct care paraprofessionals spend with each patient per occupied bed day at the four to six most efficient MTFs. The idea is to bring the less efficient MTFs up to standard or determine why they cannot meet the standard. All formulas allow for a site unique factor or provider site factor. This factor is used to accommodate any unusual conditions that cannot be easily overcome such as the condition or layout of the facility, equipment constraints, additional work requirements, patient acuity, etc. Inpatient and outpatient formulas consider support requirements as well. Inpatient

support is concerned with administrative personnel, while outpatient support considers both administrative and patient care support such as nurses and direct care paraprofessionals.

These additional factors are evaluated and adjusted by the SAT. This team visits every MTF to help set up and teach the model, and to solve any problems that may arise. The team also helps determine a unique outpatient element called the available provider hours. These are the average hours any one provider is available each month in the clinic to see patients. This number can be affected by factors such as continuing education, readiness training, surgery hours, ward round, administrative tasks, etc. This variable is very important in the calculation of earned FTRs, and is one the CO has some control over.

There is no single manpower standard or formula for the IS department. A total number for administrative personnel is determined by the formula:

$$EBC = 21.879 + 0.06038X$$

where X is equal to the total earned FTRs for the MSBFs, and EBC is equal to the number of personnel allocated for the financial management, personnel management, information systems, manpower management, and administrative workcenters combined. It is up to the CO to divide the manpower authorized by the formula among the five workcenters. According to Mr. Oaks of the Army HSC, this was done

deliberately because of variations in organizational structure among administrative services at Army MTFs. A function that is performed by the IS workcenter in one MTF may be performed by another workcenter in another MTF. The MTF CO is in the best position to determine local manpower requirements. [Ref. 15]

C. AIR FORCE MEDICAL INFORMATION SYSTEMS STAFFING STANDARD

In June of 1991 the Office of the Air Force Surgeon General approved a staffing standard for the Medical Information Systems (MIS) workcenter [Ref. 3,16,17]. This standard was the result of an operational audit and used correlation regression analysis to determine a staffing equation. Its developers were looking for workload factors not subject to immediate change. [Ref. 18] The standard manhours equation was

$$Y = 12.96 + 2.253X_1 + 2.077X_2 + 17.30X_3$$

where Y was the manhours earned, X1 was the number of microcomputers supported, X2 was the number of dumb terminals supported, and X3 was the number of mainframes and minicomputers supported. Once manhours had been calculated and any additives or subtractives applied, the number of authorized personnel was found by dividing manhours by an Air Force standard for monthly manhours. This final number was used as a lookup in a Standard Manpower Table to determine the

grade, Air Force Specialty Code (AFSC), and title for each authorized individual. [Ref. 3,16,17]

Not long after development, the shortcomings of the staffing standard were recognized. The standard had not included all functions of the MIS workcenter, and suddenly new functions appeared. The deployment of DoD's Composite Health Care System (CHCS) and the spread of Local Area Network (LAN) technology changed the workcenter description. The increasing use of contractor personnel, as well as the knowledge that future technology would bring rapid change, further complicated the situation. [Ref. 3,17,18] JHMET was asked by the Air Force to develop a new staffing standard based on these considerations.

JHMET evaluated outside industry's approach to MIS operations. Some were staffing on variables such as the number of LANs or the population served. One standard advocated 1 MIS employee for every 35 people served. [Ref. 18] This writer has heard of other industry standards such as 1 person per 100 personal computers [Ref. 19].

The new standard, now under consideration by the Air Force Office of the Surgeon General, uses the number of authorized MTF personnel to determine MIS manpower requirements. A twelve month average is taken from the Unit Manpower Document and a ratio of 1 to 55 is established. Manpower tables recommend grade levels and AFSCs. For example, the manpower

table in Appendix A shows the number, grade levels, AFSCs, and titles of MIS workcenter personnel in MTFs with total authorized personnel of 826 to 990. Grades and AFSCs can be substituted to meet local requirements. This standard will apply to all Air Force MTFs with the exception of workcenters undergoing or having already undergone A-76 contract cost comparison studies, Air National Guard Units, or United States Air Force Reserve Units. [Ref. 16,18]

D. NAVY BASELINE EFFICIENCY REVIEW

As indicated in the introduction, there is no Navy-wide MTF IS staffing standard. A first generation ER is currently underway and will provide a baseline for workcenter descriptions and performance indicators (PIs). Ready Team Leaders at Health Support Offices Norfolk and San Diego will refine these baselines and identify those core functions they consider to be valid PIs. A second generation ER will be conducted applying updated baselines and core functions. [Ref. 20] Because there is no Navy-wide MTF IS staffing standard, some of the approaches or techniques utilized by individual MTFs will be described.

Some MTFs attempted to justify most or even all of their manpower requirements through the use of PIs. The following is one example:

$$YC = 4.692X1 + 9.5X2 + .75X3 + 6.0X4 + 8.114X5 + 1.785X6$$

where
YC = total monthly manhours

X1 = average monthly number of stand-alone computers supported
X2 = average monthly number of mainframes and minicomputers supported
X3 = average monthly number of programmed reports produced
X4 = average monthly number of ad-hoc reports produced
X5 = average number of workcenters supported
X6 = average number of classes taught per month [Ref. 21].

These PIs varied from MTF to MTF as did the values in front of them.

One MTF made no attempt to justify IS manpower resources through specific PIs, but instead used the standard equation:

$YC = .4799(X \times .7104)$
where
YC = manpower requirements
X = in-house medical doctors.

Another MTF proposed no specific equation, but went to great lengths to list every function performed and the number of hours per month spent performing the function. A total of 33 PIs were listed ranging from monitoring the AIS security program to reviewing/responding to E-mail requests. [Ref. 20]

Nearly all of the ERs evaluated point to the need for additional manpower. Continuing downsizing and budget uncertainty will likely negate this. It is too early in the ER process to know what direction and format a Navy IS staffing standard will take.

E. CONCLUSION

The MTF IS manpower models of the Army, Air Force, and Navy described in this chapter indicate a quantitative as

opposed to a qualitative approach to staffing standards. Chapter IV will describe those qualitative factors that should be considered in the development of a staffing standard for a DoD MTF IS department, and evaluate current Service standards in light of these factors.

IV. QUALITATIVE FACTORS IN THE MTF IS ENVIRONMENT

A. INTRODUCTION

This chapter will examine those qualitative factors in the Medical Treatment facility (MTF) Information Systems (IS) environment that should be considered in the development of a manpower model or staffing standard for a Department of Defense (DoD) MTF IS department. These factors were obtained from a literature review and interviews with individuals involved in the MTF manpower model building process. Kenneth L. Rado's thesis, "An Evaluation of the Manpower Staffing System for the Naval Facility Engineering Command's Facilities Acquisition Mission," was especially helpful in generating ideas [Ref. 6]. The following factors will be discussed:

1. the movement of DoD health care to a managed care environment
2. the macro vs micro approach to staffing standards
3. model flexibility and its usefulness in planning
4. quality considerations in model applications
5. model consistency
6. the cost-effectiveness of a model
7. turnover and economies of scale.

Army and Air Force models will be evaluated in light of these issues. Because a Navy MTF IS staffing standard has not been developed, it cannot be evaluated, however, discussions pertaining to the two Air Force models apply to similar

individual Navy MTF models developed during the baseline Efficiency Review (ER).

B. COORDINATED/MANAGED CARE INITIATIVES

Since the early 1990's, the Military Health Services System (MHSS) has been the subject of major reform initiatives. The MHSS, as is the civilian health care community, is facing major challenges in the form of escalating health care costs resulting from high-priced medical technology, proliferation in facilities and services, increased labor costs, changes in medical practices and standards, increased utilizations, and normal inflation [Ref. 22]. DoD facilities face additional challenges resulting from uneven access to care, overcrowding, maldistribution of health care resources, duplication of effort, lack of standardized health care benefit packages, decreased DoD funding levels, downsizing of military end strength, and base closures. To meet these challenges, DoD is moving steadily toward a coordinated/managed health care delivery system similar to that employed by the private sector. The four major components of this system are the establishment of Health Service Regions (HSRs), the implementation of fixed-price at-risk TRICARE support contracts, the development of a "triple-option" managed care program structure, and the transition to a capitation based method for allocating health care funds.

In 1993 12 HSRs were established within the United States, each with a designated Lead Agent MTF/Commander (see Appendix B). The responsibilities of the Lead Agent include:

1. developing a regional Health Services Plan
2. developing a regional TRICARE Support Contract
3. developing procedures for coordinating health care delivery between military and civilian health care providers within the region
4. monitoring CHAMPUS budget targets
5. coordinating utilization management and quality assurance activities
6. coordinating the development of a region-wide information systems modernization plan for all MTFs.

Lead Agents work cooperatively with regional MTF commanders and their staffs to develop, implement, and manage the regional health plan. The success of the plan depends in large measure upon this ability to work together and to share resources.

Since 1966 non-active duty beneficiaries have been able to receive health care from civilian sources, when it was not available at DoD facilities, through the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS). This traditional fee-for-service program will progressively be replaced by fixed-price at-risk contracts in all regions. These contracts will create a civilian provider network to support the triple-option TRICARE plan. This plan will allow participants to chose among three options, each differing

according to provider choice, enrollment fees, and cost-shares. Beneficiaries will retain freedom of choice, but will be encouraged to use those providers that have been contracted at lower rates. [Ref. 11]

The final component in DoD's move toward coordinated or managed care is the concept of capitation. Historically, DoD has programmed and budgeted for health care programs on the basis of resource consumption and workload trends. Those MTFs that generated more workload were rewarded with larger budgets. [Ref. 22] This approach discouraged the efficient use of limited resources and led to inflated workload counts. Under a capitation-based budgeting system, MTF commanders are responsible for providing health services to a defined population for a fixed amount per beneficiary. Because the amount is fixed, there is no incentive to increase services or provide more costly care, and inappropriate hospital admissions and excessive lengths of stay are discouraged. Regimens of care and outcomes measurement/analysis become a means of promoting cost-efficient quality health care. [Ref. 11,22]

The MTF IS department must change to meet the needs of managed care. It can no longer concentrate on the stand-alone, departmentally oriented information systems of the past. An external rather than internal business focus is required. Richard B. Freebrun in his presentation to the

American Academy of Medical Administrators and the American College of Healthcare Information Administrators listed six information trends for the 1990's:

1. focus on quality
2. emphasis on cost of services and outcome measures
3. focus on productivity improvements
4. need to integrate information
5. emphasis on patient centered systems
6. linkage between diagnostic, treatment and information technology. [Ref. 23]

These trends point to an expanded role for IS; that of technological advisor and system integrator in the strategic planning process.

As a technological advisor, the IS department must be aggressive, creative, and innovative. IS staff should have a good understanding of MTF operations and interrelationships with the community at large. Knowledge of the managed care environment is as important as technical competence, enabling IS to anticipate user needs. Management should be made aware of how technology can assist in the reengineering of business processes. Information is the key to effective MTF integration into the health care delivery system continuum. Not only must this information be timely, but it must provide management and clinicians with a strategically focused, cost-beneficial approach to resource management and clinical care.

Because managed care will require coordination and cooperation among regional MTF commanders, information must be patient rather than departmentally oriented [Ref. 23]. A health care manager or provider should be able to follow a patient throughout the continuum of care; the sources of care (either MTF or civilian provider), outcomes, cost, and quality. This information cannot easily be obtained from present DoD stand-alone systems. In the future, departmental systems will be integrated into larger, more complex comprehensive MTF or regional systems. Already, DoD systems such as the Composite Healthcare System (CHCS) and the Medical Expense and Performance Reporting System (MEPRS) have eliminated many Service specific programs. These expanded systems will create communication requirements far beyond current capabilities. To meet these demands, IS resources may need to be consolidated into regional IS service centers. While individual MTFs would retain IS departments, major planning and coordination would take place at the regional level.

The Army's Manpower Staffing Assessment Model (MSAM) model compliments the managed care environment. Its developers are aware of the budget constraints of a capitation-based allocation methodology. Even though the model is workload based, workload is not used to justify budget increases. MSAM allows MTF management to determine the origins of workload

variations, and to take corrective action where necessary. This model, in conjunction with other management tools, is used by the Commanding Officer (CO) and a managed care office at each MTF to distribute workload in the TRICARE arena. Determinations are made as to whether care should or even can be provided in-house. The goal is a cost-effective, efficient organization that provides quality health care. [Ref. 15]

The integration and management of regional resources will require the cooperation and coordination of all MTF COs. Because the CO must answer to a regional as well as to at least one Service commander, he should be allowed a certain amount of flexibility and autonomy in the management of local resources. The Army model supports this flexibility and autonomy by allowing the CO to rearrange and/or shift manpower to create workload efficiencies. This is especially true in the administrative departments where the CO must determine organization and staffing requirements from a general equation. Of course this autonomy could backfire if manpower is improperly distributed. The ability of the IS department head to accurately forecast the information technology needs of the MTF, as well as the presence of political agendas and common prejudices, could influence the "share" of manpower resources available for IS.

It could be argued that the new Air Force IS manpower standard, currently under review by the Air Force Office of

the Surgeon General, supports the managed care environment by providing a "business" approach to IS management. This model was derived from popular MTF industry standards, standards that have been under development for years and reflect the combined wisdom and experience of a cost-conscious environment. Now that the MHSS is moving into the managed care environment, an environment characterized by competition for limited resources, it must adopt different business practices and attitudes. The only stipulation to the Air Force model is that it does not affect military readiness or cost-effectiveness [Ref 18]. Exceptions are allowed to counter these or other unique conditions.

C. MACRO VS MICRO APPROACH TO STAFFING STANDARDS

Staffing standards can reflect a micro or "functional" approach, or can reflect a macro or "big picture" approach. The old Air Force staffing standard is a good example of the former. It attempted to identify those primary functions or activities performed by the IS department. Unfortunately, all functions were not considered in the equation, and new functions shortly appeared. This points to a problem with the functional approach. Appendix C provides a listing of major system functions that could be performed by a MTF IS department [Ref. 24]. It would be difficult to include all these functions in a single staffing equation, or even to decide which functions to consolidate with other functions. In

addition, the future will bring technological changes to the health care environment such as surgical robots, telemedicine, digital imaging, computerized patient records, and mobile computing [Ref. 25]. These changes will add new dimensions to an already impressive IS functional catalog.

The new Air Force IS manpower standard is modeled after non-DoD MTF IS standards. These standards reflect the "big picture" or macro approach, as opposed to the functional approach of the old Air Force model. They do not attempt to identify or quantify every function or activity performed by IS. IS is seen as a support service that pervades and influences all units within the organization. As such, its staffing is viewed as a function of the number of people or organizational components supported. The Army model employs a similar "big picture" methodology in that IS manpower numbers are dependent upon earned Mainstream Business Function (MSBF) Full Time Requirements (FTRs). As a MTF downsizes and its earned MSBF FTRs decrease, there should be a corresponding decrease in IS FTRs. The future of IS in the DoD managed care environment is still uncertain, making it difficult if not impossible to predict manpower requirements. Therefore, a macro-based model, such as the Air Force and Army models described above, may prove to be more flexible and resilient than a micro-based model.

D. FLEXIBILITY AND PLANNING

To the model builder/user, the degree of flexibility and the usefulness of the model for planning purposes are core concerns. Management at both the MTF and the Surgeon General Office level use manpower models to estimate/justify future manpower needs/requirements.

Theoretically, the new Air Force MTF IS manpower standard simplifies the planning process for Surgeon General Office staffers. They need only know authorized MTF manpower levels to estimate IS Air Force Specialty Codes (AFSCs) and grade levels. These AFSCs and grades may be modified to meet local or Service needs, but management has a good indication of future requirements. Although the MTF CO does not have to use those exact AFSCs and grades specified in the manpower tables, his flexibility is limited to the numerical constraints of the model. He can request "exceptions" to meet local or unusual conditions, but these will be difficult to justify. The Surgeon General's Office will support those requirements indicated in the manpower model, but will be hard pressed to provide additional manpower due to increasing budget constraints.

The Army's MSAM model has been built to provide some degree of flexibility and autonomy to the MTF CO, but this could generate coordination and planning problems with higher commands such as the Health Services Command (HSC) and the

Army Surgeon General Office. The Table of Distributions and Allowances (TDA) is the official Army document authorizing MTF manpower levels. If the model drastically alters manning levels or the CO decides to restructure departments such as IS, manpower requirements will not match those authorized in the TDA. Over time, manpower requirements should match those authorized in the TDA, but a new CO or a change in MTF or regional health care delivery could once again create an imbalance. This could make it difficult for HSC or the Surgeon General Office to plan for future manpower requirements.

E. QUALITY CONSIDERATIONS

Quality, referring to the degree of excellence of a product or service, has become a buzzword for the 1990's in most organizations. Total Quality Leadership (TQL) programs have been implemented in many DoD organizations, including MTFs. One aspect of quality in manpower models is the ability of a model to accurately predict manpower requirements. Another pertains to the caliber of the manpower provided. Model parameters that influence manpower quality include education levels, training, years of experience, and the familiarity with existing or proposed systems. One can only speculate as to whether the Army or the new Air Force model will correctly estimate IS manpower requirements. Neither model has been fully implemented, and data describing quality

is difficult to quantify. In addition, the Army model only specifies staffing levels for administrative services of which IS is only one part. This leaves room for considerable variability in actual IS manning levels. The Army model makes no attempt to control IS manpower quality, while the Air Force model does "appear" to consider manpower quality in that it recommends specific grades and skill levels which are indicative of manpower ability.

F. MODEL CONSISTENCY

If a manpower model is applied at two MTFs with similar characteristics and produces the same result, it is said to be consistent. Consistency is generally desired for reasons of fairness and planning. Unless "exceptions" become the rule in the application of the new Air Force model, an unlikely occurrence given current budget constraints, the model will be invariable in that MTF staffing levels alone will determine IS manpower levels. The Army's MSAM model seeks manpower and workload consistency at the MSBF workcenter level across MTFs, but does not address consistency at the IS workcenter level. The IS workcenter is only one of five workcenters grouped into Administration. Its manpower level will fluctuate according to CO preferences.

G. COST-EFFECTIVENESS

Is a model too expensive to employ? Do the costs outweigh the benefits? Such questions are important in the application

of any model. The development and deployment costs of both the Army and new Air Force model are unknown to this writer, and post-deployment costs can only be evaluated at the surface level. According to the developers of the Army model, only minor modifications will be required after deployment. The benefits realized in cost savings and workload efficiencies will more than offset the initial costs. From all appearances, the Air Force model will be easy to implement. The formula is simple to calculate, with authorized staffing levels found in the Unit Manpower Document. The models will no longer be cost-effective, however, if the DoD health care environment enters a state of constant and erratic change requiring numerous adjustments and reiterations.

H. TURNOVER AND ECONOMIES OF SCALE

In some large metropolitan areas such as Washington, D.C. where the cost of living is high, government jobs are plentiful (at least among those already in government service), and higher paying non-government jobs abound, turnover among government employees can be rampant. Retraining becomes an issue as civilians change jobs within the government to increase grade levels, or leave government service entirely for a more lucrative position. The constant movement of military personnel puts further pressure on the system. An increase in retraining leads to a decrease in

productivity as less time and effort is spent on constructive work.

DoD managed/coordinated care encourages the sharing or consolidation of regional resources where appropriate. A consolidation of IS resources may produce economies of scale resulting in the need for fewer manpower resources at the MTF level. Instead, IS manpower resources may be concentrated at a regional office or center.

Manpower turnover and economies of scale do not appear to be considered in the Army and Air Force models. Perhaps this is appropriate in that it may be too difficult to quantify such variables. Some consideration, however, should be given to these concerns.

V. SUMMARIZATION, CONCLUSIONS AND RECOMMENDATIONS

This thesis has attempted to describe the qualitative factors in the Medical Treatment Facility (MTF) Information Systems (IS) environment, and to present/examine current IS Service manpower models or staffing standards in light of these factors. Because there was no standard Navy model, only the Army and Air Force models were reviewed.

The first factor examined was the Department of Defense 's (DoD) movement into the coordinated/managed care environment. This "business" approach requires the cooperation and coordination of all MTF commanders, with a focus on quality and productivity improvement. IS is seen as a technological advisor and system integrator in the strategic planning process. The Army's Manpower Staffing Assessment Model (MSAM) and the new Air Force IS manpower standard compliment the managed care environment by attempting to relate IS manpower requirements to MTF support needs. IS is seen as essential to the effective/efficient management of health care resources and the provision of patient care. In both models, IS manning levels will fluctuate in response to changes in MTF organization, function, and staffing.

The micro or "functional" approach verses the macro or "big picture" approach to staffing standards was considered. The problems identified with the functional approach were defined. Both the Army and the new Air Force models reflect

the "big picture" approach by viewing IS staffing as a function of the number of people or organizational components supported. They are not as likely to be modified or abandoned as IS functions change and/or expand to meet future MTF needs.

The next factors discussed were model flexibility and the usefulness of the model for planning purposes. The new Air Force model could prove invaluable for planning at the Air Force Surgeon General Office level. Future requirements for IS manpower totals, Air Force Specialty Codes (AFSCs) and grades can be determined easily from authorized MTF manning levels. Because of the model's specificity, however, it is somewhat inflexible at the individual MTF level. The Army's model, on the other hand, is relatively flexible at the MTF IS department level, but could create some planning problems for higher commands such as the Army Surgeon General Office because of imbalances between the Table of Distributions and Allowances (TDA) and model recommendations and/or MTF Commanding Officer (CO) propensities.

Quality in a manpower model refers to the ability of the model to accurately predict manpower requirements and to provide educated, well-trained, and competent personnel. Because of the newness of both the Army and Air Force models, it is too early to know if the models will accurately predict manpower requirements. The Army model does not control the quality of IS personnel, but the Air Force model appears to

consider manpower quality in that it recommends specific grade and skill levels.

Another factor explored was that of model consistency, a trait generally desired for reasons of fairness and planning. The new Air Force model is very consistent in that the primary determinant of IS manpower is MTF staffing levels. The Army's model is inconsistent in that IS manpower levels will vary according to the MTF administrative structure and CO preferences.

The cost-effectiveness of each model was addressed. Both models should prove to be cost-effective after the initial development and deployment stages, however, this effectiveness may erode if the DoD health care environment does not eventually stabilize.

The last factors examined were those of turnover and economies of scale. High turnover can result in lower productivity as retraining becomes an issue. Economies of scale in IS manpower requirements could follow as DoD consolidates IS resources to meet managed care needs. These factors are difficult to quantitize and were not evident in either the Army or the new Air Force model.

The Joint Healthcare Management Engineering Team and the three Services are in the process of developing or perfecting separate MTF IS manpower models or staffing standards. Diverse approaches have been taken as described in the various

Service models. The Army's MSAM model and the new Air Force model do not exhibit every qualitative factor described above, but they do appear to support many of them. Because these factors, as well as additional ones not considered in this thesis, contribute to model effectiveness, efficiency, and longevity, they should be incorporated into the model building process.

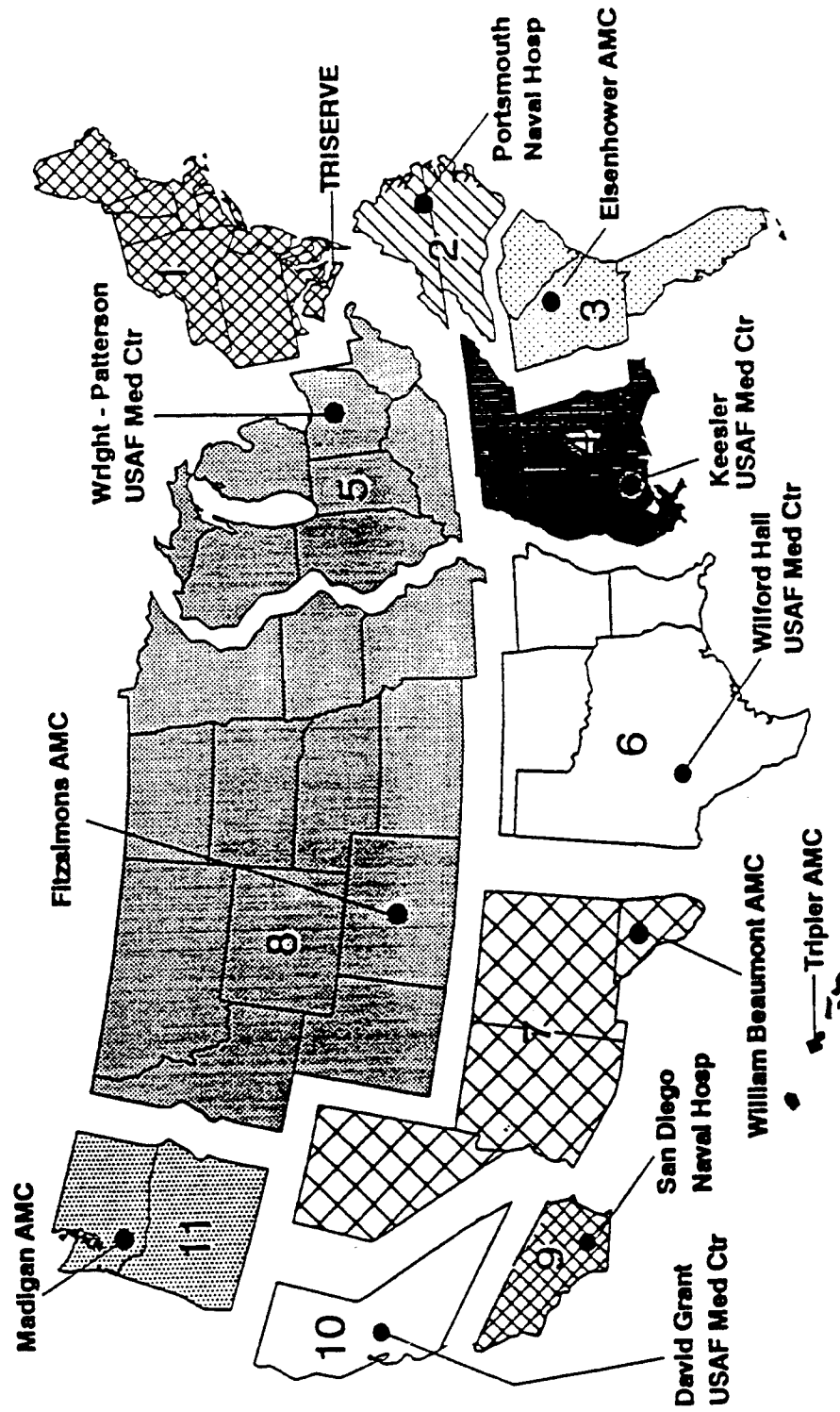
APPENDIX A. [AIR FORCE MANPOWER TABLE]

AUTHORIZED MTF PERSONNEL		From:	826-	881-	936-
		To:	880	935	990
<u>Air Force Specialty Title</u>	<u>AFSC</u>	<u>GRADE</u>	<u>MANPOWER REQ</u>		
Health Services Admin, Auto Funct App Anlyst	C41A3	CPT	1	1	1
Health Ser Mgr, Auto App Monitor	V4A000	LT			1
Health Ser Mgt Supt, Auto App Monitor	V4A091	SMS	1	1	
Health Ser Mgt Craft Auto App Monitor	V4A071	MSG	1	1	1
Health Ser Mgt Craft Auto App Monitor	V4A071	TSG	2	2	2
Health Ser Mgt Jour	4A051	SSG	3	3	4
Health Ser Mgt Jour	4A051	SRA	3	4	4
Health Ser Mgt Appr	4A031	A1C	<u>5</u>	<u>5</u>	<u>5</u>
		TOTAL	16	17	18

FIGURE 1



DOD HEALTH SERVICE REGIONS



April 21, 1994

APPENDIX C. [MAJOR MTF IS FUNCTIONS]

1. AUTOMATION
 - A. Customer Support
 - B. Security
 - C. Training
 - D. Computer Operations
 - E. Programming
 - F. Database Management
 - G. System LAN Administration
 - H. Maintenance
 - I. Contract Management
 - J. System Engineering
 - K. Configuration Management
2. COMMUNICATIONS, DATA, VOICE, VIDEO
 - A. Customer Support
 - B. Security
 - C. Training
 - D. Contract Management
 - E. Maintenance
 - F. Configuration Management
 - G. Customer Liaison
 - H. Technical Support
 - I. Communications Operations
3. AUDIO/VISUAL
 - A. TV Studio
 - B. Photo Lab
 - C. Illustrations
 - D. Training Aids
 - E. Equipment Management
 - F. Conference Room Management
 - G. Contract Management
4. RECORDS MANAGEMENT
 - A. Retiring Administration Records
 - B. Correspondence Control
 - C. Mail Room
 - D. Central Files
 - E. Freedom of Information Act
 - F. Privacy Act
5. PRINTING AND PUBLICATIONS
 - A. Forms Control
 - B. Regulations
 - C. Receipt and Distribution of Regs/Pubs
 - D. Copy Machines
 - E. Fax Machines
6. LIBRARY MANAGEMENT
7. ANALYSIS
 - A. Bio Medical Stats
 - B. Workload Reporting
 - C. Report Preparation
8. INFORMATION MGT
 - A. Budgeting
 - B. Supervision
 - C. Personnel Mgt

LIST OF REFERENCES

1. DODINST 5010.37, *Efficiency Review, Position Management, and Resource Requirements Determination*, 17 November 1987.
2. DODINST 6025.12-STD, *Joint Healthcare Manpower Standards*, November 1989.
3. Phone conversations between Jeanne Luther and this Author, Joint Healthcare Management Engineering Team, July and August 1994, (provided AFMD 5170).
4. Richard Pastore, "Uncertain Diagnosis," *CIO*, pp. 38-46, 1 May 1994.
5. Shelly D. Christian and William K. Dorr, *Staffing Sources of USAF Medical Center Systems Offices: A Study of their Relationship to Information Systems Quality*, Master's Thesis, December 1992.
6. Kenneth L. Rado, *An Evaluation of the Manpower Staffing System for the Naval Facility Engineering Command's Facilities Acquisition Mission*, Master's Thesis, March 1987.
7. Lawrence J. Haas, "Skating on the Hard Freeze," *Government Executive*, February 1994.
8. *Practical Comptroller* revised August 1994, Naval Postgraduate School, pp. C2-C4.
9. OPNAVINST 5310.14D, *Efficiency Review (ER) Process for Total Force Shore Manpower Requirements Determination - Policy and Procedures*, 4 May 1993.
10. OPNAVINST 1000.16G, *Manual of Navy Total Force Manpower Policies and Procedures*, 6 November 1990.
11. Steven R. Lamar, *DoD Health Care Reform: TRICARE A Basic Program Overview*.
12. DOD INST 6015.1-M, *Glossary of Healthcare Terminology*, March 1989.
13. Phone conversations between CDR Bruce L. Custis and this Author, Executive Officer, Naval Medical Information Management Center, 1994.

14. Taro Yomane, *Statistics, An Introductory Analysis*, pp. 368-392, Harper and Row, Publishers Inc., 1964.
15. Phone conversations with J. Oaks and Monica Talamantez and this Author, Army Health Services Command, July and August 1994, (provided Manpower Staffing Assessment Model).
16. Phone conversations with LtCol David J. Runt and this Author, Headquarters Air Force Medical Support Agency, July and August 1994, (provided AFMD 5170 and AFMS 5170).
17. Phone conversations with CAPT Laurence J. Mellon and this Author, July and August 1994, (provided AFMD 5170).
18. Phone conversation with Luan Houser and this Author, Headquarters Air Force Medical Support Agency, 16 August 1994.
19. Phone conversation with Jan Sherman and this Author, Kaiser Permanente Medical Center Oakland, 22 June 1994.
20. Phone conversation with Shirley Matuly and this Author, Ready Team Leader, Naval Healthcare Support Office Norfolk, 1994, (provided MTF Efficiency Reviews).
21. Phone conversation with Jessie Faustino and this Author, Ready Team Leader, Naval Healthcare Support Office San Diego, 1994, (provided MTF Efficiency Reviews).
22. Assistant Secretary of Defense (Health Affairs), *Policy Paper on Preparing the Military Health Services System (MHSS) for Capitation-based Resource Allocation*, 23 July 1993.
23. Richard B. Freibrun, *Information Technology Implications for Healthcare Reform and Managed Care -- New Choices, New Decisions*, Briefing, 19 November 1993.
24. Major Fred W. Peters, Joint Medical Manpower Study ACTION MEMORANDUM, Major System Functions (Army, Navy Air Force), Compiled by JHMET, 12 March 1993.
25. Alexandra Wyke, "The Future of Medicine, New anatomy lesson, please," *The Economist*, 19 March 1994.

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